The Energy Sector
of the Blue Economy

Kristian Petrick
eco-union

Workshop, Marseille, 31 May 2017

Getting an idea of the importance of the sectors (today vs. 2030 globally)

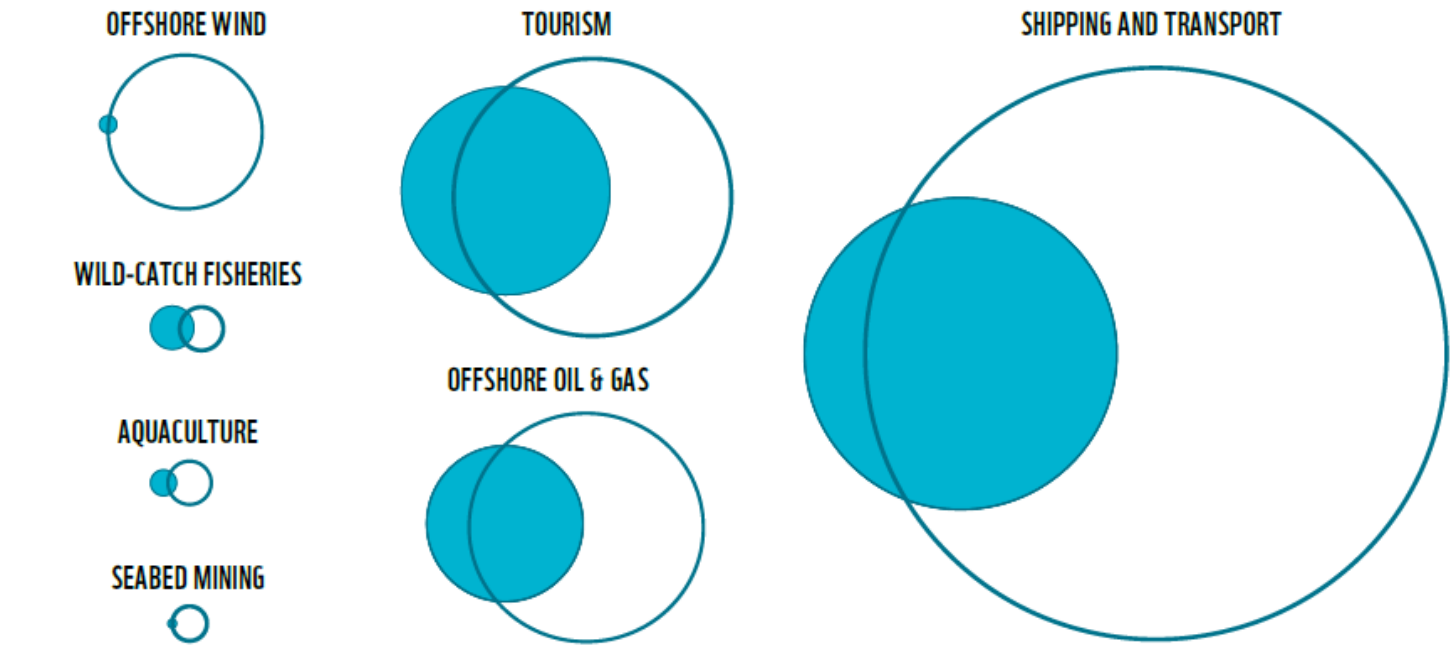


Figure 1. Rough estimates of the relative sizes of maritime sectors at the global scale based on Gross Domestic Products (GDP) figures from 2005[1] and their expected growth to 2030 (projections made by WWF)

44% of the Med area are either contracted or designated for oil & gas exploration (Med Trends)

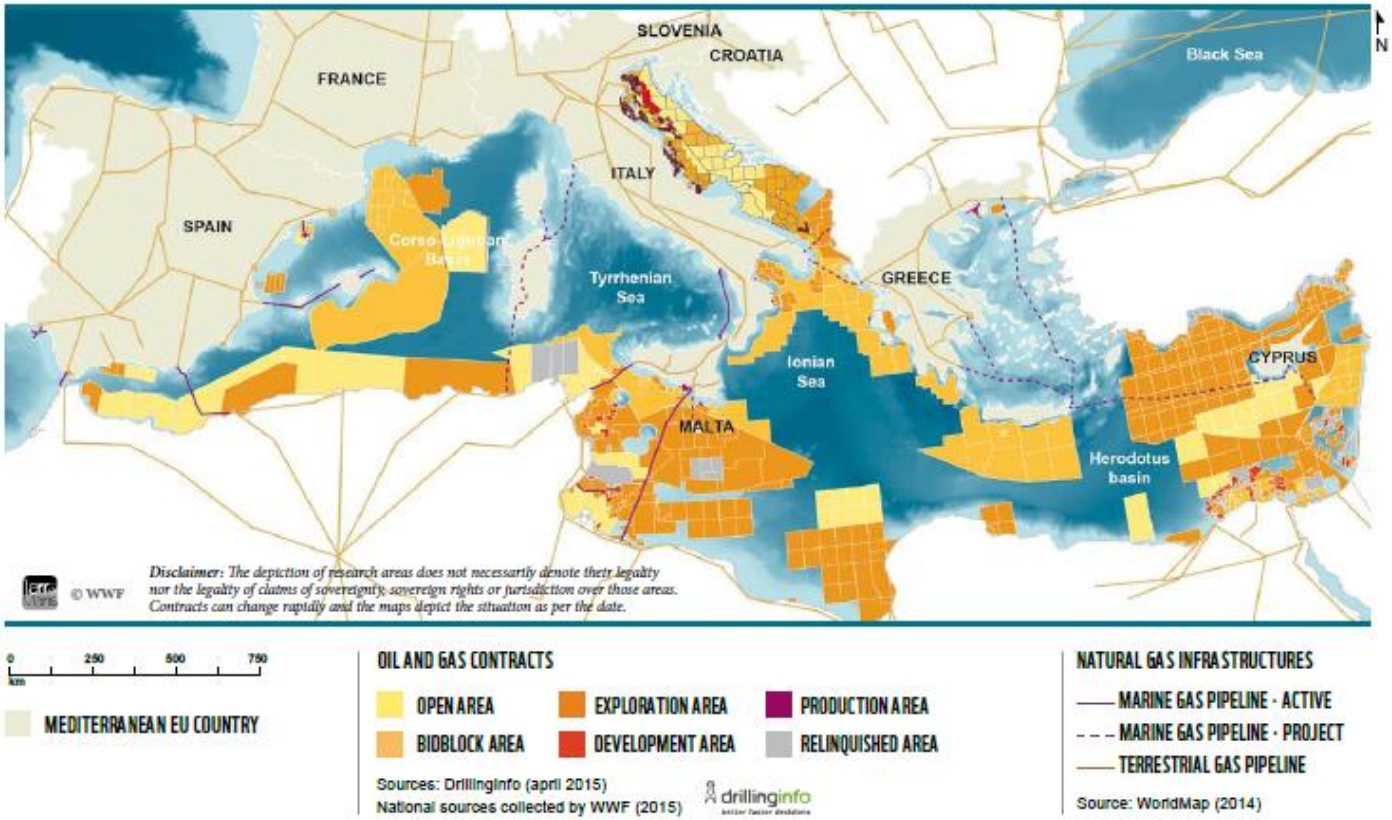


Figure 3. Current offshore oil and gas exploration and production contracts in the Mediterranean Sea, and active and projected gas pipelines

Med Trends forcasted high gas production increase

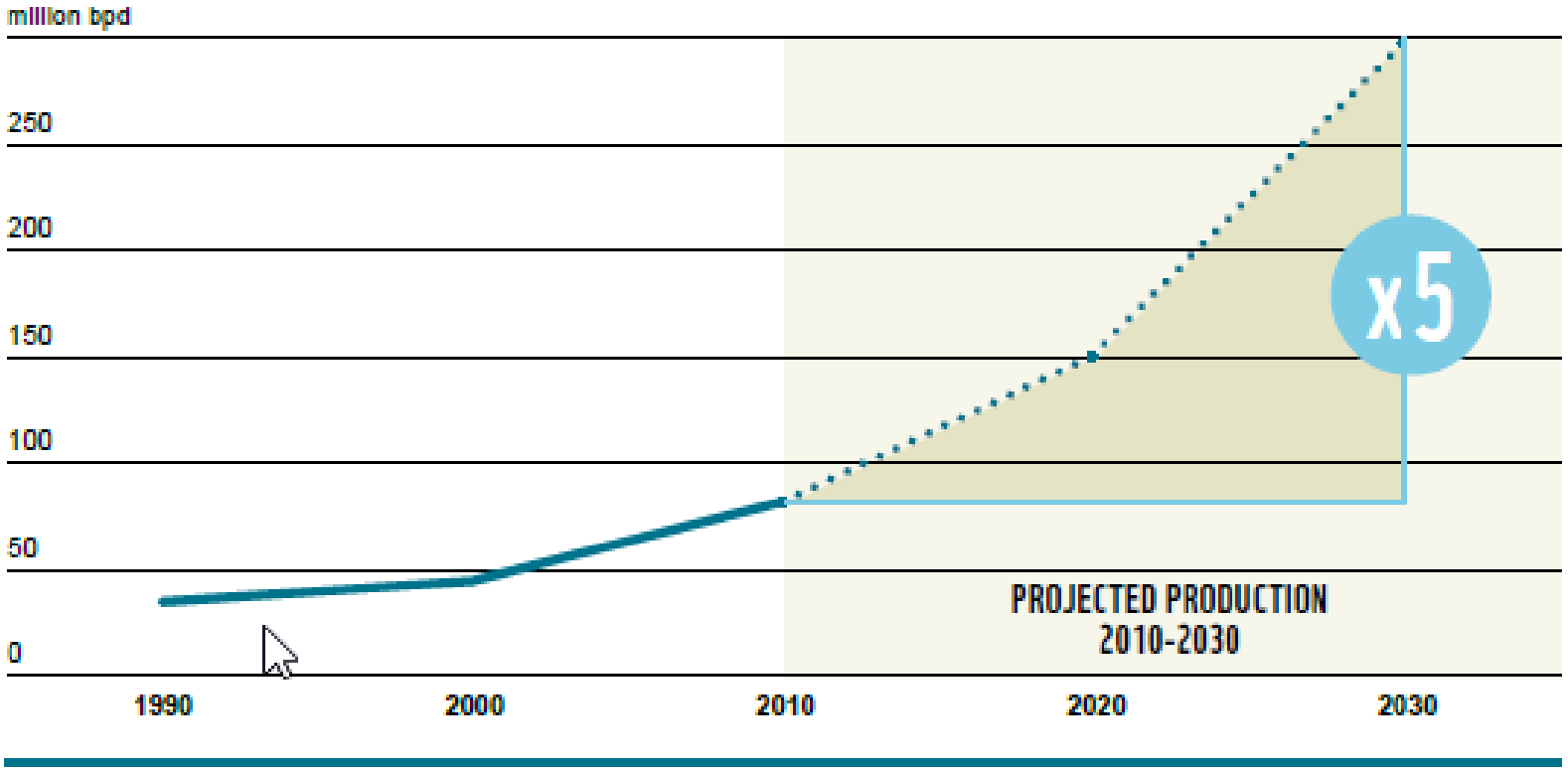
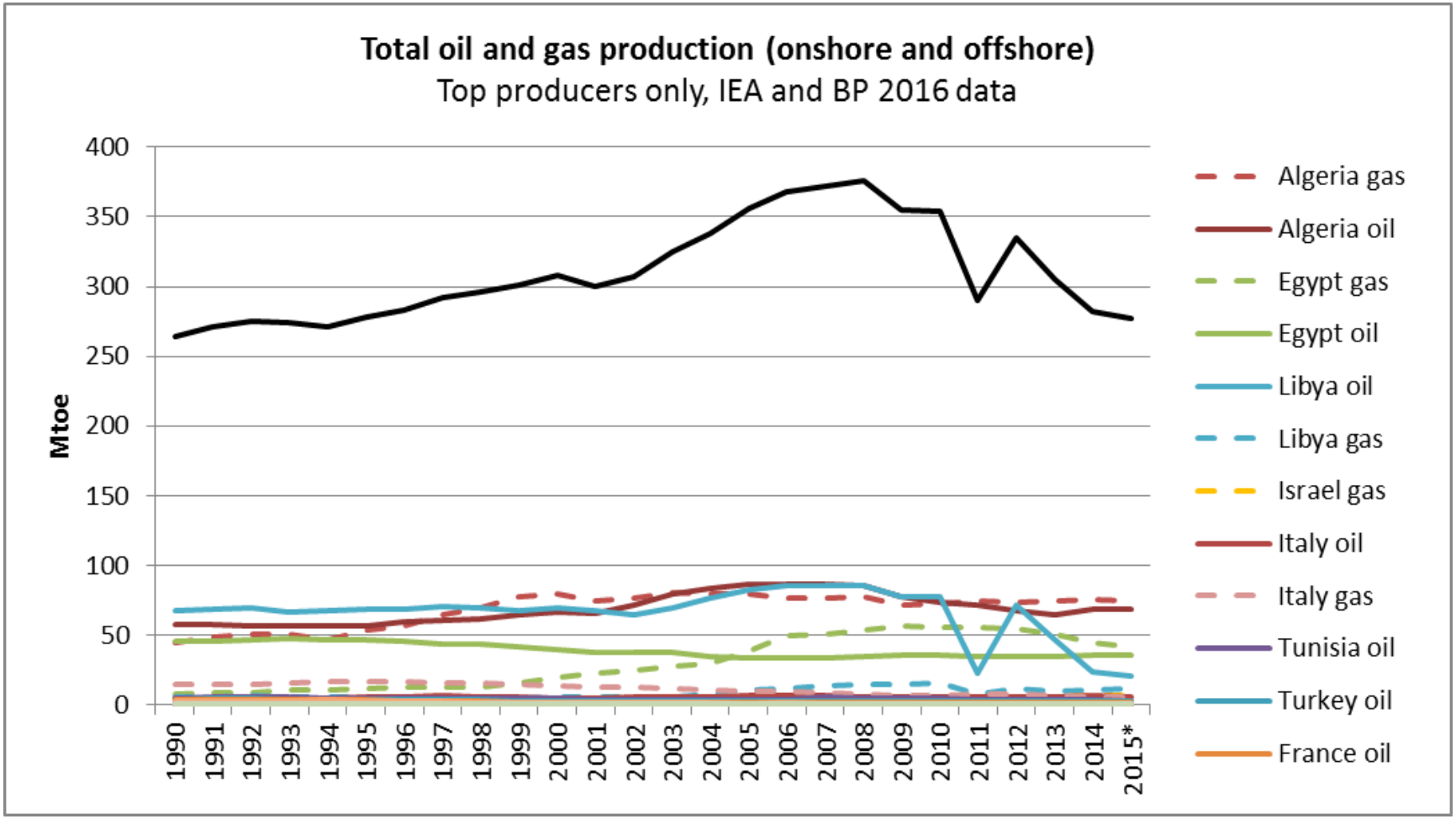
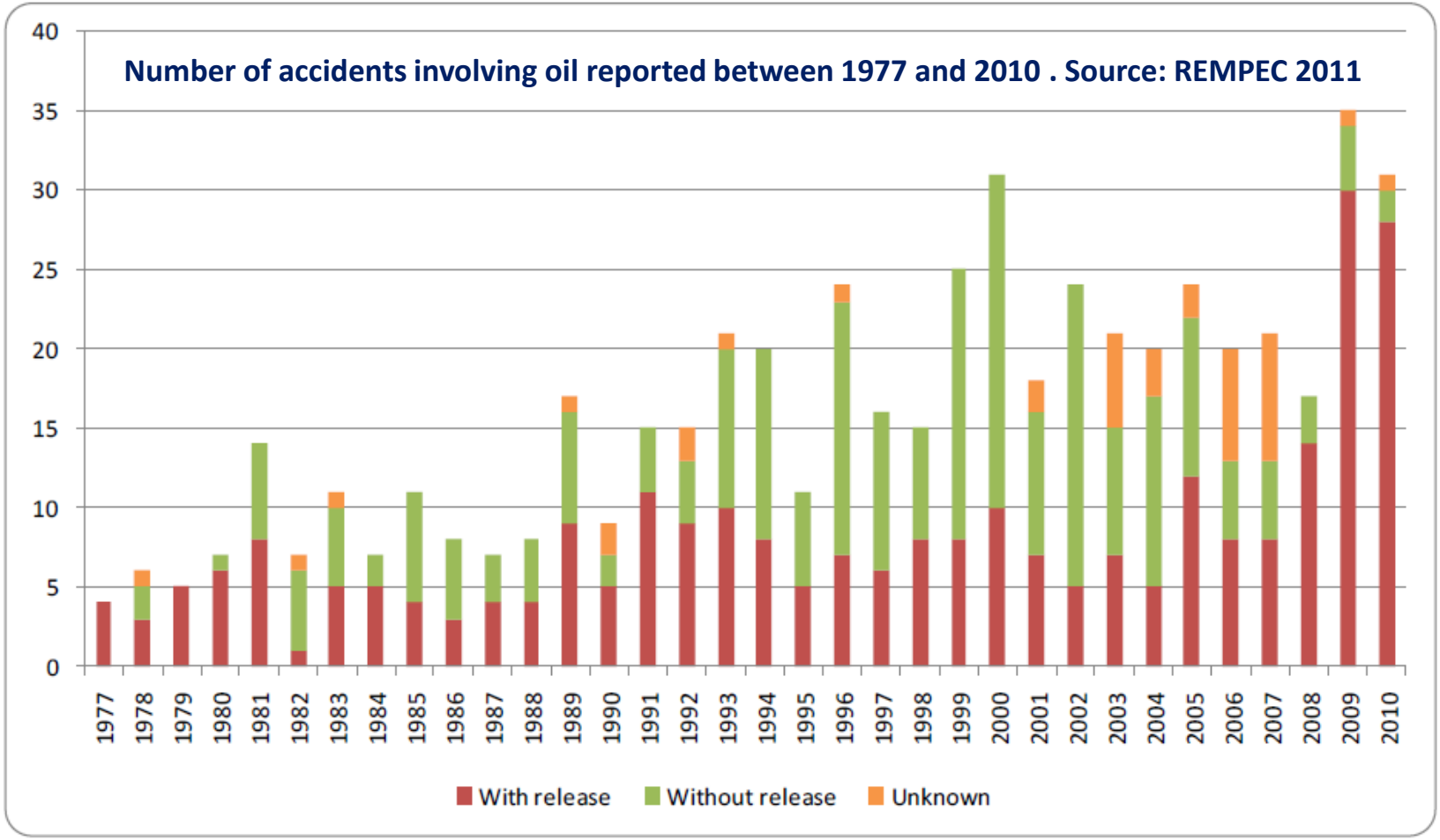


Figure 5. Gas production forecast in the Mediterranean Sea, based on past trends (in Million tonnes of oil equivalent). Projection of past trends[3]

Unclear development of offshore oil and gas activities (not separate from onshore); Egyptian figures are key



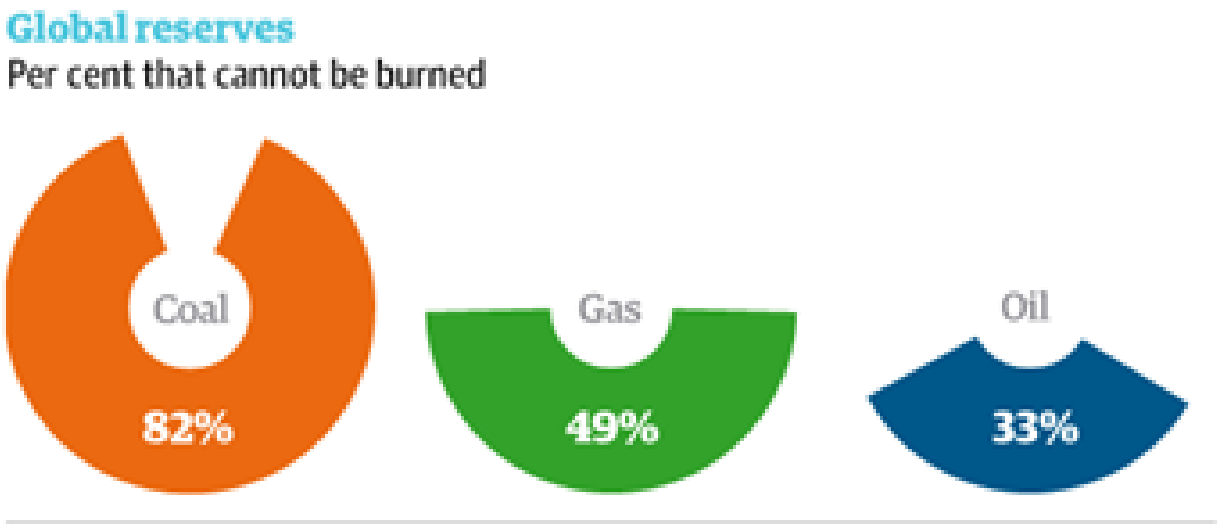
Increased number of accidents is – according to REMPEC – mainly due to a better compliance to reporting procedures



Globally about 9% of oil spills come from offshore production

- Bulk of oil spills from maritime traffic (68%) and onshore facilities (23%).
- But in regions with intensive production, related marine pollution can rise to 32%.
- Spills from offshore oil production are mostly small (<7t) or medium (<700t). They occur mainly during loading and discharging operations in ports and oil terminals.
- In May 2011, exploratory drilling in the Leviathan gas well (Israel) caused a major leak of brine (12–14 thousand barrels per day).
- Globally, the majority of well blowouts have occurred during exploratory drilling operations.
- Many new explorations in the Med Sea take place in seismic areas.

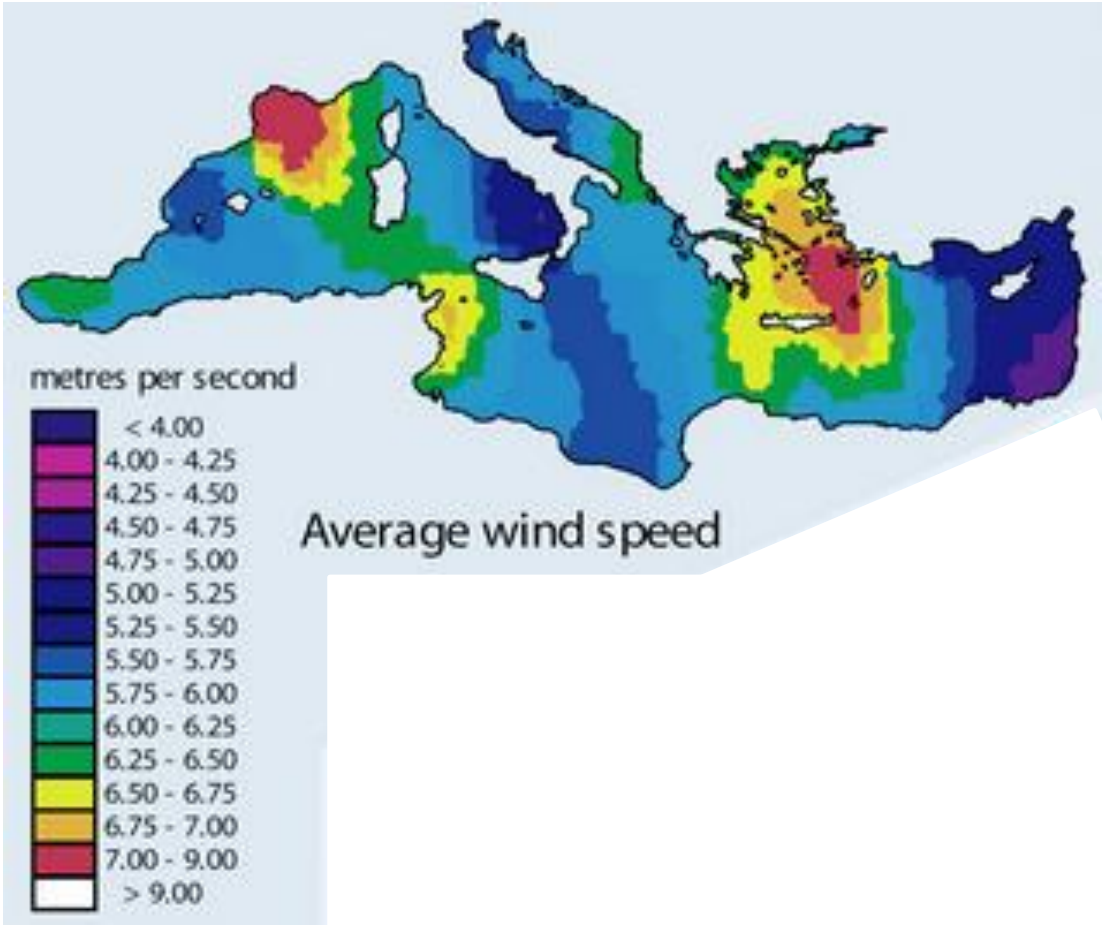
A third of known, extractable oil, half of gas and over 80% of coal reserves must not be burnt to reach 2ºC target



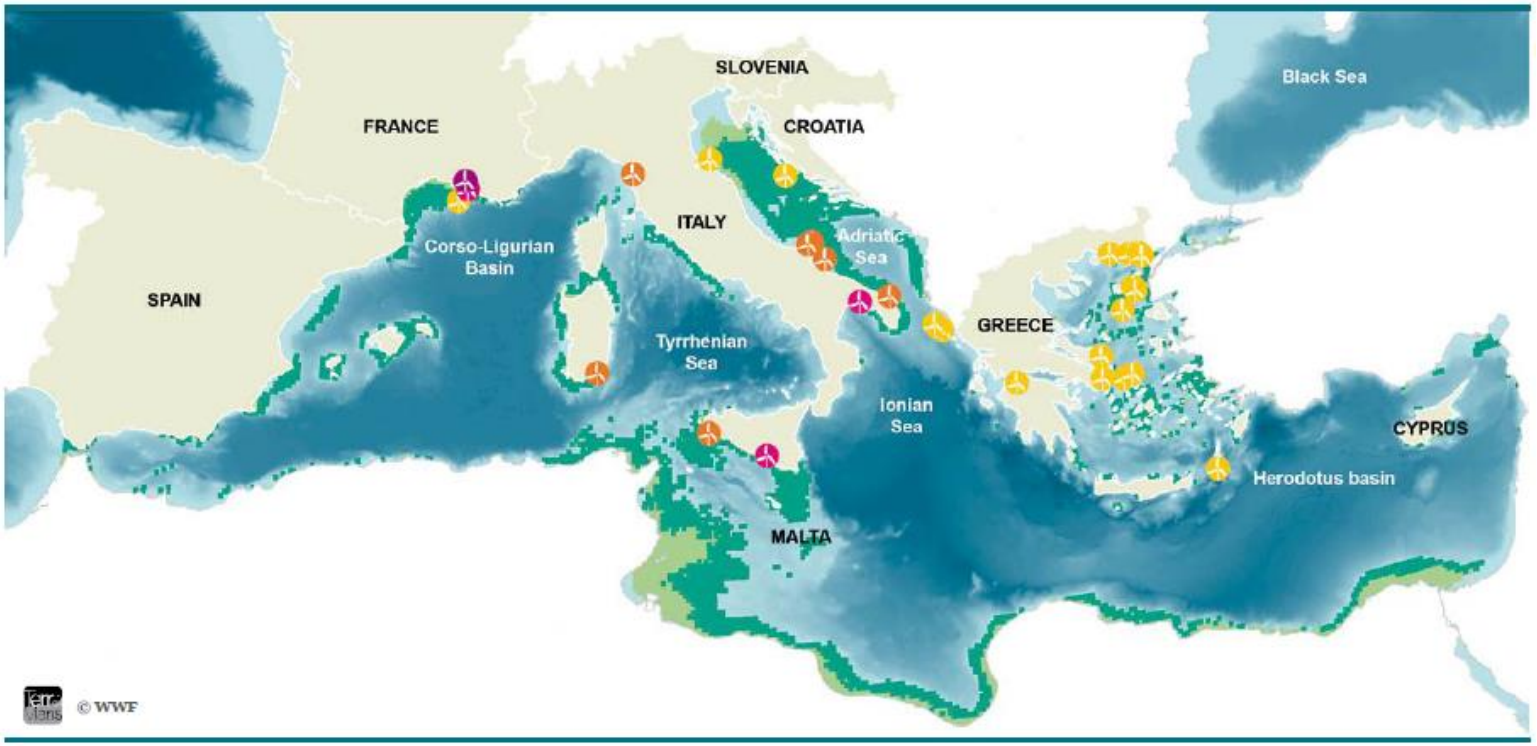
http://newsroom.unfccc.int/unfccc-newsroom/most-fossil-fuels-must-stay-in-the-ground-new-study/

2014: UN Secretary General Ban Ki-moon called upon companies to reduce their investment in fossil fuels, or to divest completely.

Offshore wind projects can be expected in certain areas



There are no commercial offshore wind projects in the Med yet



Gusts of change: How effective policy is catalysing a booming offshore wind sector

Kristian Petrick

IEA-RETD Operating Agent

All-Energy 2017, 10 May 2017, Glasgow

IEA-RETD
Renewable Energy Technology Deployment

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This study presents a comparative analysis of approaches to offshore wind development internationally

Policy & Regulation:

- Which policy and regulatory frameworks have been most effective in catalysing growth?
- How can policymakers effectively balance the risk profile for developers and government?

Industry Structures:

- How and why have industry structures evolved over time?
- What can policymakers do to support the development of robust industry structures?

Project Risk Management:

- How can developers manage risk throughout the project lifecycle?
- Which developer models and strategies have been most successful?

Delivered by:

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Green Giraffe
The renewable energy financial advisors

Offshore wind can achieve several government objectives

Decarbonisation:

- Clean, renewable source of electricity
- Highly scalable

Energy security & system benefits:

- High load factors (40-50%)
- Flexible generation

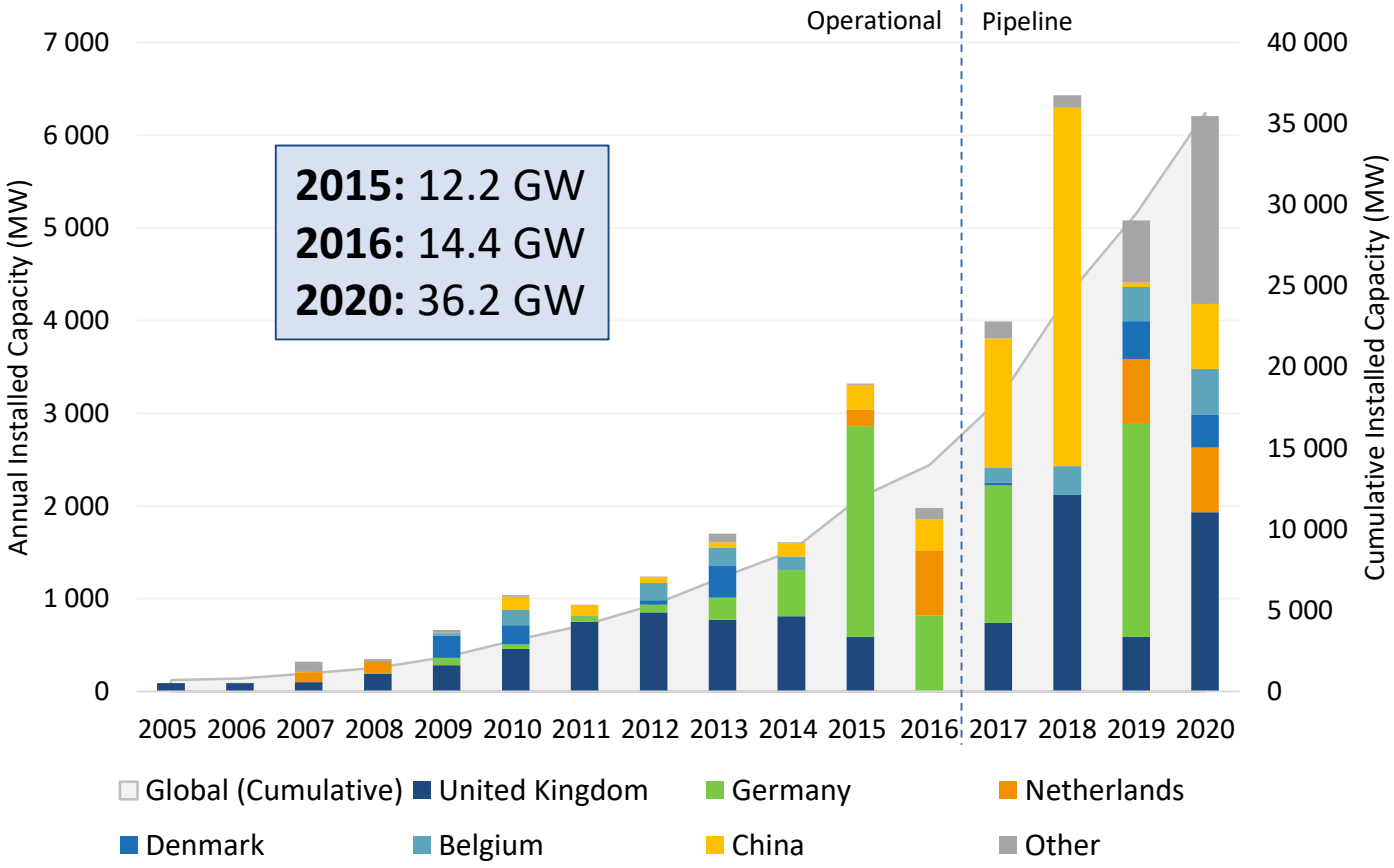
Costs to consumers:

- Considerable cost reduction achieved and further expected
- Expected to be ‘subsidy free’ in Europe within next decade

Local economic benefits:

- Align with industrial strategy
- Job creation & safeguarding

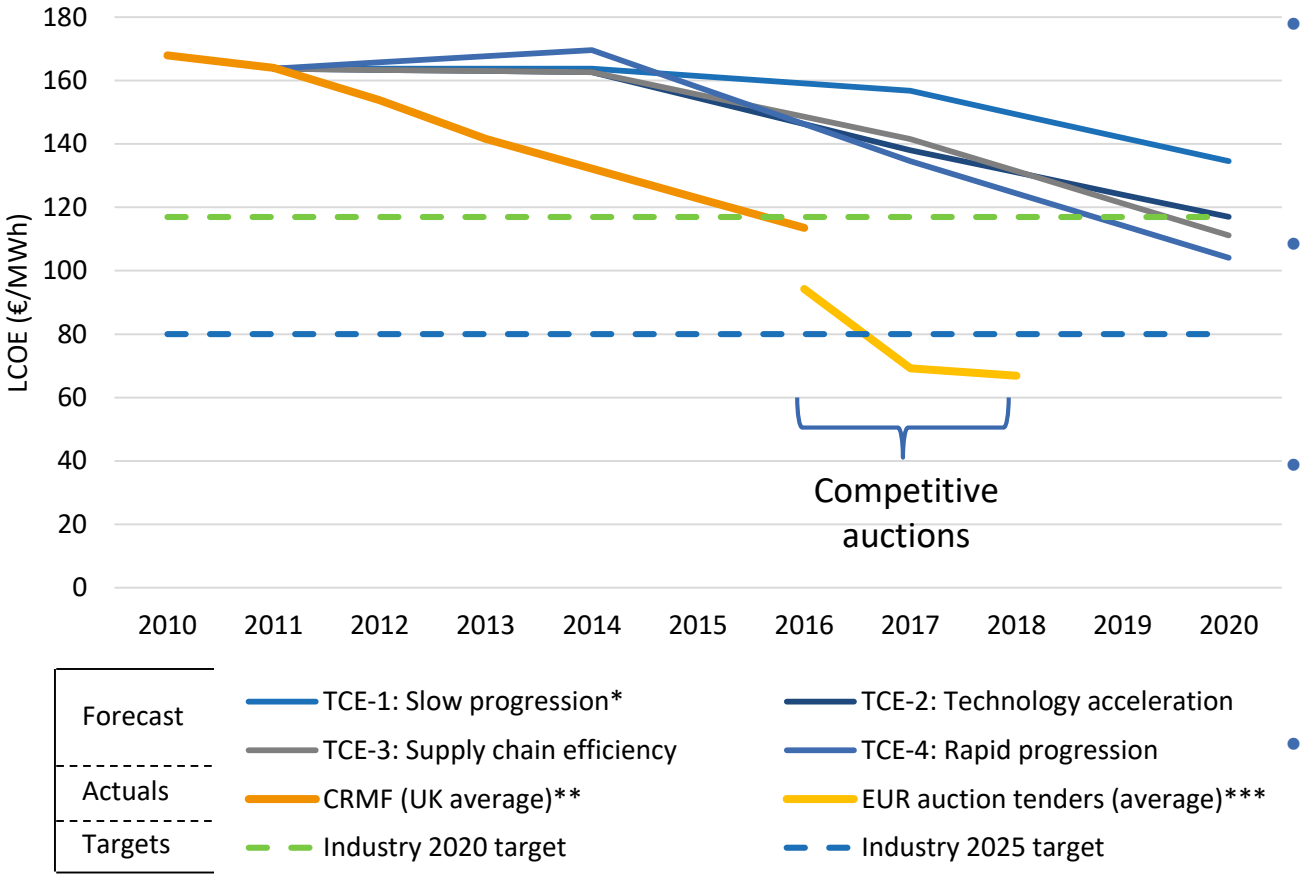
Offshore wind is a rapidly maturing energy technology, with deployment set to almost triple from 2015 to 2020



Source: 4coffshore, WindEurope, Carbon Trust analysis
Notes: Pipeline reflects central deployment scenario

- Market growth historically concentrated in Europe
- Several emerging markets beginning to scale up
- Growth beyond 2020 contingent on policy support

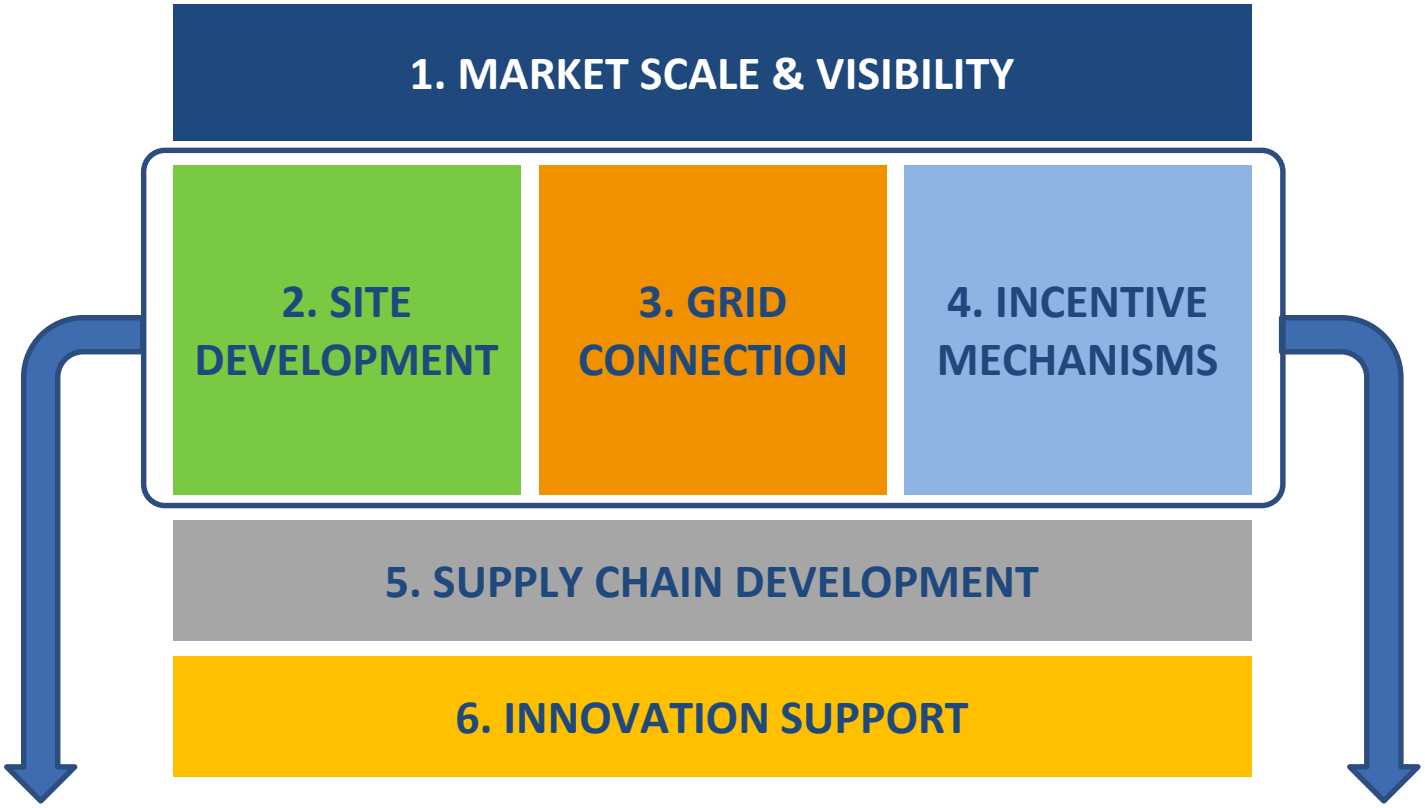
Cost reduction targets have been exceeded ahead of schedule



- Considerable cost reduction achieved since 2010
- ~60% LCOE reduction from 2010 to 2018 (FID year)
- Introduction of competitive auctions has accelerated cost reduction in Europe
- Note: Costs expected to be higher in emerging offshore wind markets

* The Crown Estate (TCE) Cost Reduction Pathways (2011)
** Cost Reduction Monitoring Framework (2017)
*** Includes grid connection and site development costs for NL and DK projects (uplift of €14/MWh). It should be noted that many of the 'actual' projects reaching FID (financial investment decision) have not yet been built.

Six key pillars of policy to support offshore wind development



Two emergent policy trends:

1. Competitive auctions **2. Centralised development models**

Market scale and visibility is widely considered the most important policy driver

- Lack of visibility creates uncertainty and increased risk for developers, suppliers, and investors
- Need to integrate offshore wind policy within long-term energy strategy
- Need to provide visibility over long time horizons
- Targets must be supported with appropriate policy levers
- Short to medium-term roadmaps can hedge against long-term uncertainty (e.g. NL)

Netherlands Offshore Wind Roadmap

- Roadmap with phased deployment over 5 year period
- Driven by National Energy Agreement to install 4.45 GW by 2023
- 5x 700 MW sites identified, de-risked, and tendered annually
- Call to increase targets by and beyond 2023

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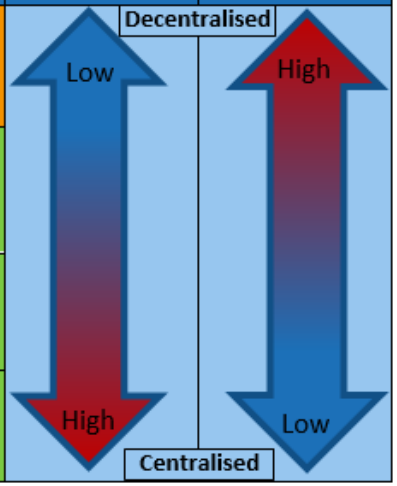
Centralised development models can de-risk offshore wind projects for developers

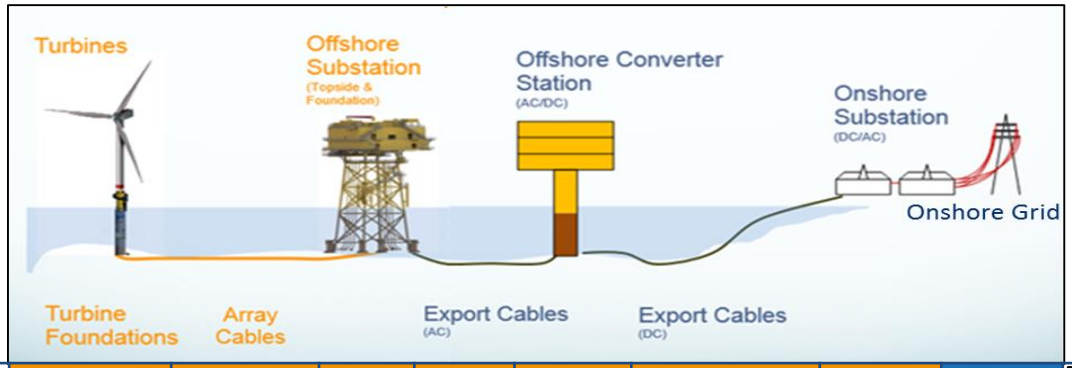
	Zone identification	Site selection	Site investigation	Consenting/ permitting	Grid application	Grid design & construction	Government risk/control	Developer risk/control
	Crown Estate	Developer	Developer	Developer via PINs	Developer / National Grid	Developer/ OFTO		
EEG 2014	Government	Developer	Developer	Developer via BSH	TSO	TSO		
EEG 2017	Government	Government	Government	Developer via BSH	TSO	TSO		
	Government	Government	Government	Government	Government /TSO	TSO		



Key: Green = Governm./TSO responsibility; Amber = Developer responsibility, PINs: planning inspectorates, BSH: Federal Maritime and Hydrographic Agency.

- Response to **higher allocation risk** from competitive auctions
- Centralised models require considerable **capacity building within government & TSOs**
- Some developers have a preference for greater **control of development activities**, particularly offshore transmission assets (risk of government inefficiency)
- Site-specific tendering can also introduce greater **portfolio risk**

Grid policy is heavily influenced by local context



Deep									
Hybrid									
Shallow									
Super shallow									

Key: Blue = TSO responsibility; Amber = Developer responsibility

- **Decentralised developer-build ('deep charging')** models can result in lower cost point-to-point transmission assets
- **Centralised TSO-build ('shallow charging')** approaches can help with strategic coordination of power transmission to ease onshore grid constraints**.** More amenable to offshore hubs and interconnection.

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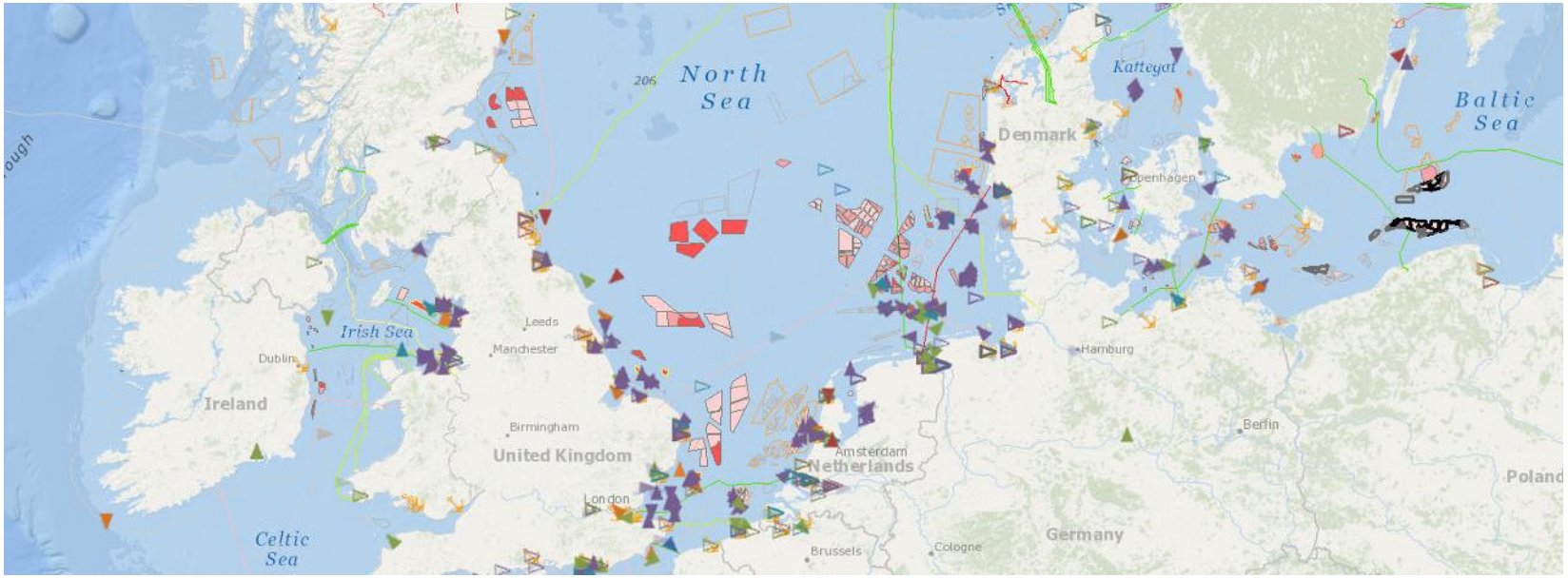
Incentive mechanisms evolve with technology and market maturity

Demonstration projects	Early commercial projects	Large-scale commercial projects
Maturity →		
Capital grants	***Fixed off-take contracts***	***Competitive auctions***
• *Supports early projects where costs are uncertain due to lack of experience* • *E.g. UK Offshore Wind Capital Grants Scheme*	• *Market-based mechanism* • *Provides commercial returns for developers, based on energy generation* • *E.g. Feed-in premium; UK ROCs*	• *Increased competition encourages cost reduction* • *Auction budgets can help to control government spend* • *E.g. UK Contracts for Difference*

- Governments take on higher risk in immature stages, shifting risk to developers as the technology matures
- Growing **technology maturity** means that emerging markets are expected to go straight to fixed off-take or competitive auctions
- Limited **market maturity** may be a barrier to competitive auctions in more isolated markets

European countries have benefitted from clustering around the North Sea region



Source: 4coffshore

- Isolated emerging markets will face greater challenges in developing robust industry structures
- Tailored policy support is required to develop necessary industry structures

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Key Findings and recommendations

- Offshore wind is on the cusp of sharp growth and marked cost reduction
- Industry is entering a market maturation phase in Europe
- Emerging markets will face greater challenges in developing robust industry structures
- Development has been underpinned by supportive policy frameworks
- Two emergent policy trends are evident:
    1. Competitive auctions
    2. Centralised development models
- These policy trends are having a material impact on the risk profile for developers
- Capacity constrained auctions necessitate greater government de-risking

Continued policy support and industry collaboration will be critical to maintaining cost reduction and expanding offshore wind to new markets.

THANK YOU!

For additional information on RETD

Online: www.iea-retd.org

Contact: info@iea-retd.org

kristian.petrick@iea-retd.org

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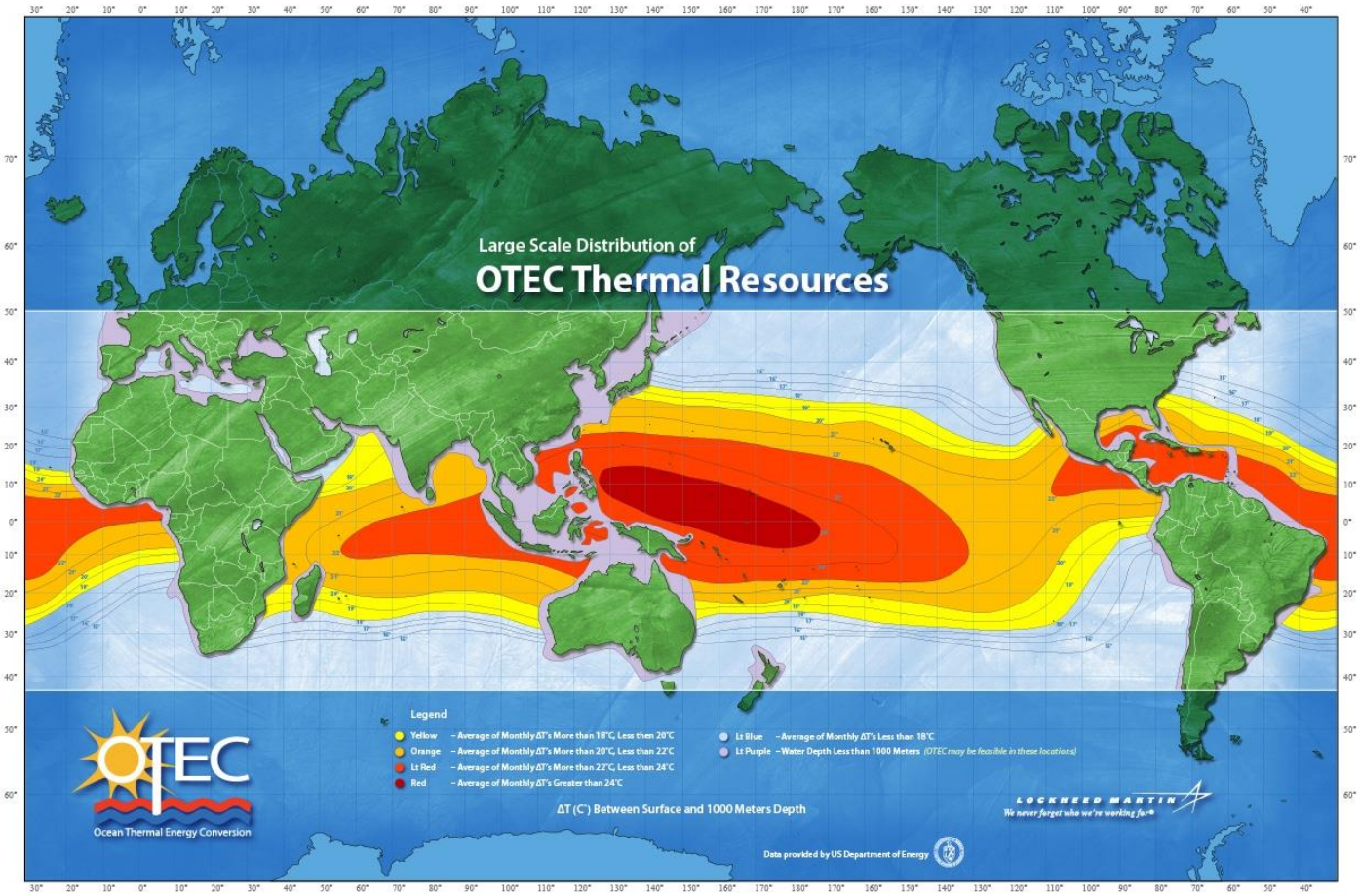
Apparently no sufficient OTEC potential in the Med

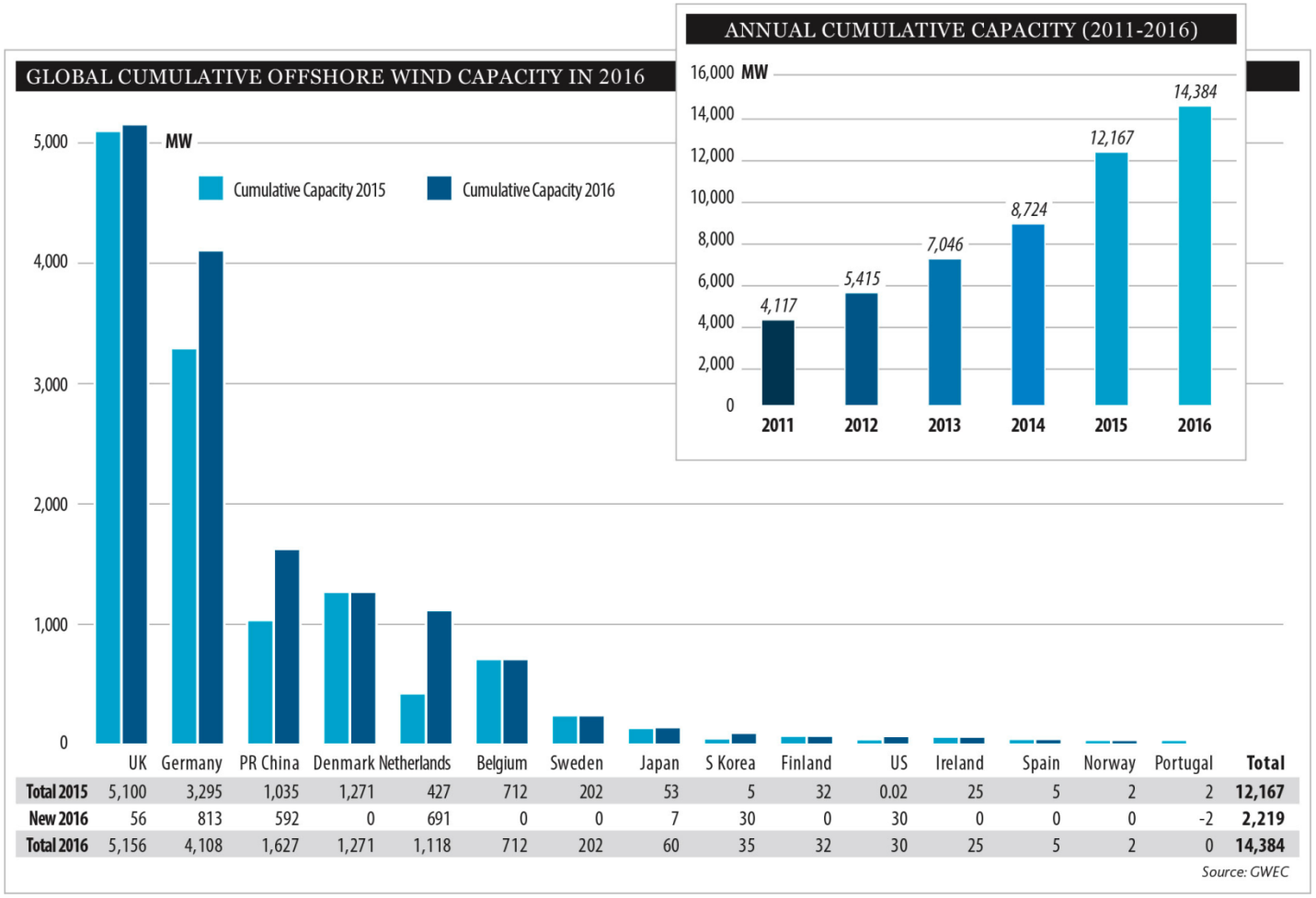


Estimation of Offshore share by country (own calculation based on IEA data and some Med Trends assumptions)

Country	2015* [Mtoe]	Percentage offshore of total production (estimated)	Offshore Production [Mtoe], estimated
Egypt gas	41	80,0%	33
Egypt oil	36	71,4%	25
Libya gas	11	66,7%	8
Israel gas	7	80,0%	5
Italy gas	6	66,0%	4
Tunisia oil	3	80,0%	2
Turkey oil	3	80,0%	2
Libya oil	20	6,4%	1
Italy oil	6	16,0%	1
Algeria gas	75	1,0%	1
Algeria oil	68	1,0%	1
Spain oil	0	100,0%	0
Greece oil	0	100,0%	0
Spain gas	0	100,0%	0
Israel oil	0	20,0%	0
Greece gas	0	100,0%	0
France oil	1	0,0%	0
Turkey gas	0	0,0%	0
France gas	0	0,0%	0
Slovenia gas	0	0,0%	0
Slovenia oil	0	0,0%	0
Total	**277**		**84**

GWEC 2016 report (issued April 2017)

Also in 2016 no offshore developments in Med Sea



	UK	Germany	PR China	Denmark	Netherlands	Belgium	Sweden	Japan	S Korea	Finland	US	Ireland	Spain	Norway	Portugal	Total
Total 2015	5,100	3,295	1,035	1,271	427	712	202	53	5	32	0.02	25	5	2	2	**12,167**
New 2016	56	813	592	0	691	0	0	7	30	0	30	0	0	0	-2	**2,219**
Total 2016	5,156	4,108	1,627	1,271	1,118	712	202	60	35	32	30	25	5	2	0	**14,384**

Source: GWEC